SULFUR, METHANE AND METALLIC IRON IN SOME APOLLO 17 FINES

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We report results from the acid hydrolysis of some soil samples from the Taurus-Littrow region, as part of our continuing study of the light element geochemistry of the lunar surface. As described elsewhere (1,2), hydrolysis in 6N H_2SO_4 produces the gases H_2S, CH_4, CO_2, H_2, He and N_2 which can be separated and collected. H_2S and CH_4 are oxidised to SO_2 and CO_2, respectively, before collection, the other gases being collected directly. The SO_2 and CO_2 samples are analysed mass spectrometrically to yield values for $\delta^{34}S$ and $\delta^{13}C$, respectively. The methane generated during hydrolysis is mainly produced by decomposition of carbide, although some CH_4 is apparently synthesised *in situ* by solar wind C and H (3). Similarly, most of the H_2 released during hydrolysis is produced in the reaction between Fe^o and H^+, with a small addition of directly implanted solar wind H_2.

Table 1.

Sample	S ppm	$\delta^{34}S$ ‰	Fe^o wt %	CH_4 ppm C	$\delta^{13}C$ ‰	CO_2 ppm C	$\delta^{13}C$ ‰	He ppm	N_2 ppm
70011,27	968	+7.4	0.85	21.3	+20	12.6	----	37	65
71501,22	1075	+6.4	0.77	16.2	+24	11.5	-9.0	38	128
72701,15	617		0.79	13.5	+19	23.2	-0.2	15	103
76501,20	598	+8.0	0.82	12.8	---	19.7	-5.7	24	125
78421,28	804	----	1.03	20.8	---	15.0	----	31	79

Isotope values are calculated relative to Canyon Diablo Troilite (S) and PDB (C).

The data given in Table 1 are generally similar to those reported for other Apollo landing sites. Sulfur abundances agree well with the few published data for this site. Methane abundances are high, consistent with mature soils from a fairly iron-rich environment (4), with characteristically high $\delta^{13}C$ values (1). The CO_2 abundance data do not correlate with those for CH_4, as observed elsewhere (2), suggesting either that this fraction of C is from a different source or that it is more prone to terrestrial contamination. Values given for Fe^o are preliminary, as results for implanted H_2 are not yet available. Experience suggests that corrections for solar wind H, determined by pyrolysis, lower Fe^o values by about 0.1 wt%. Values for He are high but compatible with mature, mare-derived soils. Data for N_2 should be regarded with caution as we have found that hydrolysis gives higher and more variable values than does our pyrolysis technique. For this reason, isotopic data are not presented for hydrolysis N_2. Pyrolysis studies on soils and rocks are

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presently being undertaken.

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